AUSTRALIAN QUAIL-THRUSHES OF THE GENUS CINCLOSOMA

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INTRODUCTION AND ACKNOWLEDGMENTS

Quail-thrushes are a small Australian genus of Passerine birds (Family Timaliidae), of problematical affinities. The different species occur in a variety of habitats on the Australian continent, from the stony plains (gibber deserts) and semi-arid shrub communities of the interior to the drier woodlands and sclerophyll forests of the eastern coastal regions and Tasmania. Apparently in the early days of European settlement they were extremely numerous in certain places, but during the last one hundred years many forms have been extirpated from the more closely settled areas and wheat-growing districts in several States; others are now threatened by expanding economic development and habitat losses in all parts of the continent. Outside Australia the genus is represented by a single species in New Guinea, where it is widespread in the lowland forests (fig. 1).

The quail-thrushes frequently are referred to as ground-thrushes, groundbirds, "rail babblers" (Gilliard, 1958) or "ground doves" (in Tasmania).

The Australian forms have been the subject of a careful study by A. J. and A. G. Campbell (1926). Unfortunately, no one museum

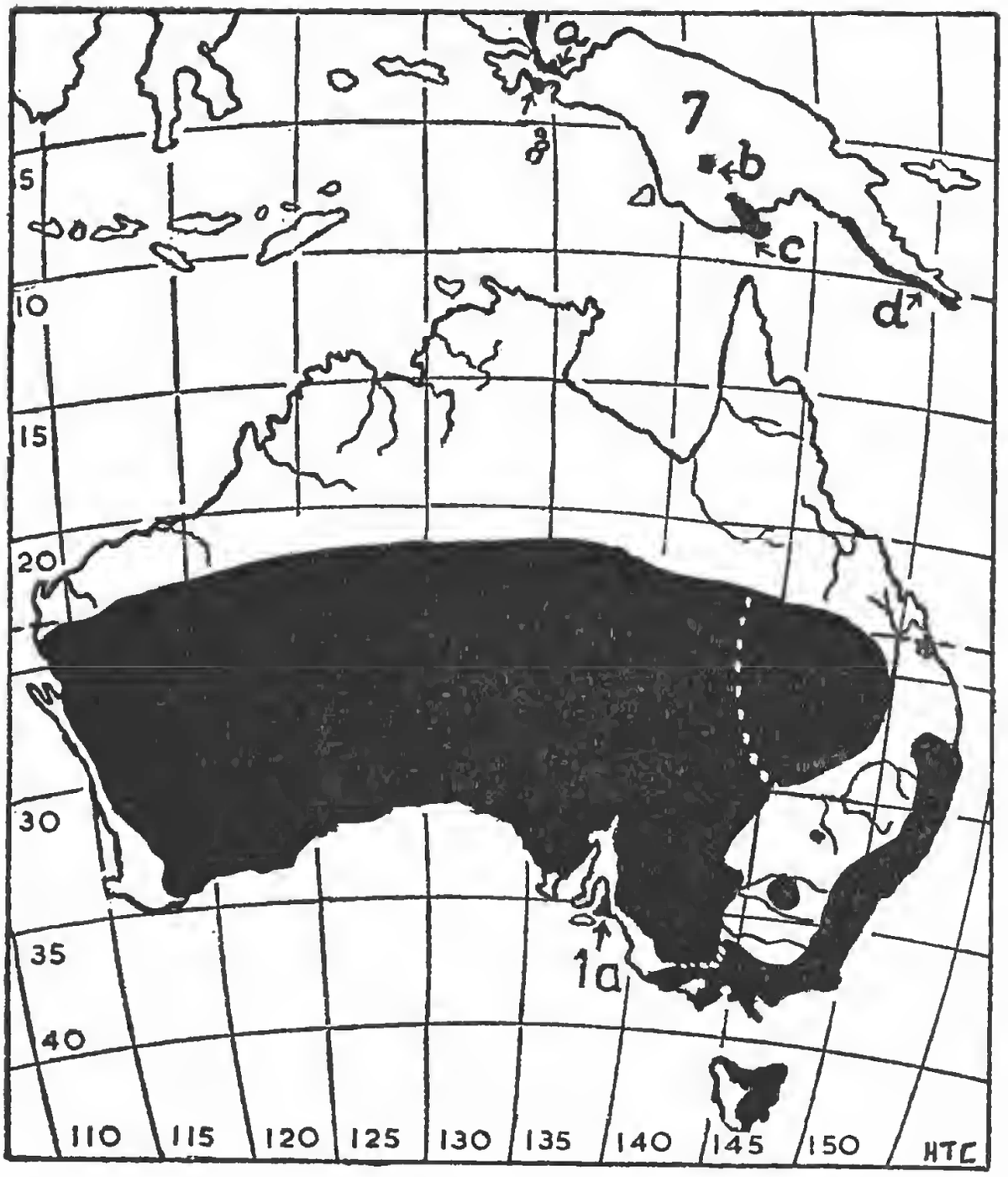

Fig. 1. Distribution of the genus *Cinclosoma*. The known limits, in Australia, Tasmania and New Guinea, are shown in black. 1a is a South Australian isolate of Spotted Quail-Thrush (*Cinclosoma punctatum*). There are four described subspecies of the New Guinea Quail-Thrush (*Cinclosoma ajax*), which is confined to lowland forests: a—*ajax*; b—*muscalis*; c—*alaris*; d—*goldei* (after Mayr, 1941).

possesses a representative series of all the known forms, among which are some of the rarest of birds. It is not surprising, therefore, that opinions are divided and much bewilderment exists regarding the taxonomy and nomenclature of the genus. Some consider that the work of the Campbells was indecisive (they refrained from using trinomials) and certain contradictory proposals have been put forward by G. M. Mathews and other writers. However, numerous specimens of the different forms have been taken during the last twenty-five years from new localities and a good deal more is now known, than formerly, about distribution and the morphological differences between the species.

The principal aim of this contribution is to add to the series of revisions of the genera of Australian birds, which have been commenced by Mayr, Serventy, Amadon, Keast, the author, and others (see Keast, 1961). To this end the writer has re-examined nearly all the specimens which were described in great detail by the Campbells (*loc. cit.*) and can vouch for the accuracy of their work. Fresh material has been compared in the museums in Adelaide, Brisbane, Melbourne, Perth and Sydney. Dr. Ernst Mayr has kindly supplied comments and measurements of specimens in the American Museum of Natural History and Dr. Allen Keast generously has made available his notes on the same collection, together with some details of specimens in the British Museum. Other information and comments have been received from Dr. D. L. Serventy and Messrs. N. J. Favaloro, W. B. Hitchcock, N. Jack, J. Jones, A. R. McGill, A. R. McEvey and G. Mack, to all of whom thanks are due. The conclusions reached in the text which follows are the writer's own. A. R. McGill's comprehensive Index to the first fifty volumes of *The Emu* has proved an invaluable aid to the work.

The Genus **Cinclosoma** Vigors and Horsfield 1827

Like many other Australian genera, *Cinclosoma* is of uncertain origin and relationships; and its position in any scheme of classification must be provisional. The genus is generally placed amongst the "babbling thrushes", or "babblers", family Timaliidae. The Australian *Official Checklist* (1926) follows Mathews (1921) and recognizes a separate family Cinclosomatidae—a procedure which has met with little acceptance.

Mayr and Amadon (1951), who have considered the question, iterate Hartert's view that the thrush-flycatcher group is a natural one and all these birds, which include the timaliids, should be placed

in the family Muscicapidae. This course has been followed in the recommended sequence of Passerine families arrived at by an international committee (see Mayr and Greenway, 1956). Amadon (1957) has found it expedient to restore family rank to both the Timaliinae and the true thrushes (Turdinae). Presumably he would retain *Cinclosoma* in the Timaliidae, as favoured by Beecher (1955).

During a recent visit to Sydney, Mr. Keith Hindwood drew my attention to a South African species, *Chaëtops frenatus*, the Cape Rock-Jumper, which bears a striking superficial resemblance to both the Australian and New Guinea species of *Cinclosoma*. Gill (1945) says "This remarkable bird and its two relatives are so difficult to place in any scheme of classification . . . they are now generally placed with the babblers, presumably on account of their long and strong legs. Their general bearing and actions are those of a thrush . . . The Cape species is found only on the mountains of the South-west Cape Province (excluding the Cape Peninsula) . . ." The coloured pictures in Gill and Roberts (1948) very strongly suggest a quail-thrush, and there may be some distant connection between the two genera (cf. Sharpe, 1903, p. 5).

Quail-thrushes are ground-frequenting birds, with skulking habits. They are about the size of a European thrush (*Turdus* sp.) that is, between 7½ and 10 inches (18-25.4 cm.) in length. Gould (1840), who preferred to call the birds "ground-thrushes", observed that "they differ more in habits and economy from the True Thrushes than their outward appearance indicates". Dorsal coloration is rufous in the desert forms and some shade of brown in all others. The broad rectrices are dark with prominent white tips, except the central pair, which are plain, frequently of the same colour as the back and, therefore, variable from one form to another. Plumage is soft and rather long, especially on the back, flanks and upper tail coverts. Wings are short and rounded; the tail is longer than the body and usually carried horizontally.

The tarsus is of medium length (*i.e.*, about twice the length of the bill), grey or nearly black in all the arid and semi-arid forms and either pale brown or flesh-coloured in the eastern coastal mainland and New Guinea species; it is scutellate in front and smooth and undivided on the plantar surface. The legs and feet are no larger or stronger than those of the average passerine.

The ratio of the lengths of the tarsus and wing ranges from 29 to 31 per cent in the Chestnut Quail-Thrush (all subspecies) and about 27 per cent in the Spotted Quail-Thrush; the values are somewhat

higher in females. The bill, which in length exceeds its distance from the eye, is slightly curved, operculate and black in colour in both sexes of all the species.

The sexes are different and can be easily distinguished in adults, in the field and in the hand. For further discussion see below.

How far modern *Cinclosoma* has diverged from the remote ancestral stock it is impossible to judge. Mayr (1944) places the group to which the genus belongs in the second-oldest category of the Australian avifauna.

Doubtless, some form of sexual dimorphism was the condition in the immediate forebear of all the widely-dispersed, present day species.

The plumage pattern of young quail-thrushes is spotted and squamate, which suggests Turdine affinities.

Campbell (1926) refers to a small white "splash" on the outermost (tenth) primary of all species. This marking is, perhaps, the last remnant of an earlier and more ornate plumage pattern which might have been similar to that of the maculose bower-birds (*Chlamydera*), in which the tips of all the primaries, including the tenth, have a whitish splash.

It is of interest to record that the only other Australian passerine genus which has been found with a similar wing-marking is *Drymodes* (scrub-robin).

In the Southern Scrub-Robin (*Drymodes brunneopygia*), the wing splash occurs irregularly in males only and, together with other plumage markings on the head and wing coverts, seems to be in the process of being lost, for the evolutionary trend in this species has been clearly towards a more sombre coloration.

In the rufous Northern Scrub-Robin (*Drymodes superciliaris*) the same wing marking is found in both sexes, as in *Cinclosoma*.

The proper taxonomic relationship of *Drymodes* to *Cinclosoma* remains undecided, albeit the two genera are often placed close together in association with a few other genera, such as the New Guinea *Eupetes*. Young scrub-robins are very similar to young quail-thrushes. However, in adults, there are considerable size differences between the sexes in *Drymodes*, males being larger than females. Also, sexual dichromatism is not evident at any stage in the development of the scrub-robins.

Beecher (1953) does not mention *Drymodes*, but says "*Cinclosoma* and *Eupetes* are slender-billed narrow-skulled terrestrial forms with

free lacrymal and, probably, forward vision; in them the pinnate character of M7b (one of the mandibular adductor muscles—H.T.C.) has virtually disappeared as it has in many honeyeaters and in the true wrens".

Mathews (1921), speaking of *Drymodes superciliaris* says: "Superficially this bird is closely related to *Cinclosoma* s. str., only differing in the longer legs, so that it appears to be a bush-loving form developed from a similar source".

Quail-thrushes are not songsters; they advertise their presence by uttering either short, harsh warning notes, a drawn-out, peevish monotone whistle, or "hissing". The birds are usually found in pairs or small family parties; they feed on insects and seeds (Lea and Gray, 1935). Like quails, they flush with a loud whirr of the wings and, after flying a short distance, they may either drop suddenly to cover and run before an intruder or take refuge on the limb of a tall tree.

The eggs, which are unmistakable in form and colour, are usually two or three in number; they are extremely thin-shelled, rather large, blunt, oval in shape, and mostly dull creamy-white, with dark frecklings and spots, which vary in coloration according to the locality and the species. The "carelessly constructed" nest of bark and grass is placed on the ground in the shelter of a low bush, tree trunk or other object.

Cinclosoma is a "natural" genus which may not be further subdivided as proposed by Mathews (1912) and Iredale (1956). Mathews separated the desert forms, with *cinnamomeum* as type, under "*Samuela*"; later he reduced this group to a subgenus in his *Working List* (1946). The minute differences, which Mathews quoted as "characters" of *Samuela*, are overshadowed by the more conservative features of plumage pattern and coloration which are common to all species. Iredale, whilst noting the similarity in plumage coloration of the New Guinea *C. ajax* to Australian forms, has advocated the adoption of the generic name *Ajax* Lesson on the grounds of "structural differences" in the bill and legs and different habits. However, the New Guinea species seems not too different to be regarded as a true quail-thrush (Sharpe, 1903; Mayr, 1941).

So far as known, the genus does not occur very far north of the Tropic of Capricorn on the mainland and it is unrecorded from any of the larger islands except Tasmania and New Guinea (fig. 1).

The distribution within Australia conforms to the prevailing pattern amongst sedentary birds in that it is a radial one. Each

species of quail-thrush is confined to a particular habitat which is typified by the vegetation association; and, of course, the vegetation associations follow the climatic zonation (rainfall), which is concentric, with regularity. Discontinuities of the major habitats are reflected in the ranges of the birds, some of which are isolated simply by indentations of the coastline (fig. 3). Present day distributions can only be explained by changes in sea level and radial shifts of populations before increasing aridity (Condon, 1954: 18). Worldwide climatic change is believed to have caused alterations to vegetation patterns during and since late Pleistocene times (Specht, 1958), the result of which could have been the expansion of the ranges of the arid zone forms and the elimination of other members of the genus in the tropical north and other parts of the continent.

The Cinclosomatini have had, without doubt, a long evolutionary history in the Australian region. Mayr (1944) thinks that the group "probably reached Australo-Papua during early or middle Tertiary" times, roughly 35 million years ago, according to Holmes (1960). The separation of the desert forms would have coincided with the initiation of the climatic trends which led to the present zonation of vegetation, perhaps during successive arid periods in the Pliocene (Waterhouse, 1940).

The Spotted Quail-Thrush (*Cinclosoma punctatum*) is the oldest member of the genus in Australia. The presence of isolated populations in South Australia and elsewhere (fig. 1) suggests that it may have been widespread in former, more pluvial times. The remaining species in Australia seem to be later derivatives from a different stock more closely related to the New Guinea species. Keast (1961) notes that New Guinea, at its closet point, is only about 100 miles from Australia and that Torres Strait has been dry on several occasions during the Tertiary and Pleistocene.

As already indicated, allopatry is another feature of the genus, although *Cinclosoma cinnamomeum* and *Cinclosoma castanotum clarum* occur together in the same sector over a large portion of South Australia (fig. 2, 3, 4). However, there are differences in habitat preferences between the two (cf. Keast, 1958, for a similar situation in the genus *Amytornis*).

The species which has been recorded farthest north of the tropic of Capricorn is, rather surprisingly, the Cinnamon Quail-Thrush (fig. 2, nos. 103, 103A). It is thought that only one species occupies the great central desert region of Western Australia, from which

ornithological observations are lacking; this is *Cinclosoma castanotum clarum*, the most distinct form of the Chestnut Quail-Thrush.

THE NUMBER OF SPECIES

On the basis of sexual dimorphism, other differences in plumage, and geographical distribution, it is suggested that the number of species remains the same as that proposed by Campbell (1926). These are:—

Cinclosoma ajax, New Guinea Quail-Thrush (four subspecies apud Mayr).

Cinclosoma punctatum, Spotted Quail-Thrush (with two subspecies).

Cinclosoma castanotum, Chestnut Quail-Thrush (five subspecies).

Cinclosoma alisteri, Nullarbor Quail-Thrush (no subspecies).

Cinclosoma cinnamomeum, Cinnamon Quail-Thrush (two subspecies).

Cinclosoma castaneothorax, Chestnut-breasted Quail-Thrush (no subspecies).

Cinclosoma marginatum, Western Quail-Thrush (two subspecies).

Several writers have proposed that the last four taxa listed above, which are all rufous-coloured, allopatric desert forms, are conspecific and that only three Australian species of *Cinclosoma* should be recognized. A few workers have united *C. alisteri* with *C. marginatum*, whilst others have preferred the arraugement in the Australian *Official Checklist* (1926), in which the last-named is combined with *C. castaneothorax*. Although at first sight this might appear to conform to modern ideas of taxonomic practice, it seems that the similarity in plumage coloration should be ascribed to convergence rather than to close relationship, for, as will be seen from the distribution map (fig. 2), there is no direct connection between *C. marginatum* and *C. castaneothorax*, which are on opposite sides of the continent. Furthermore, no evidence of intergradation has been observed between any of the rufous, desert-dwelling forms and the ranges of *C. cinnamomeum* and *C. alisteri* are contiguous in South Australia. So far as known, *C. marginatum* is not in contact with either *C. cinnamomeum* or *C. alisteri* (fig. 4).

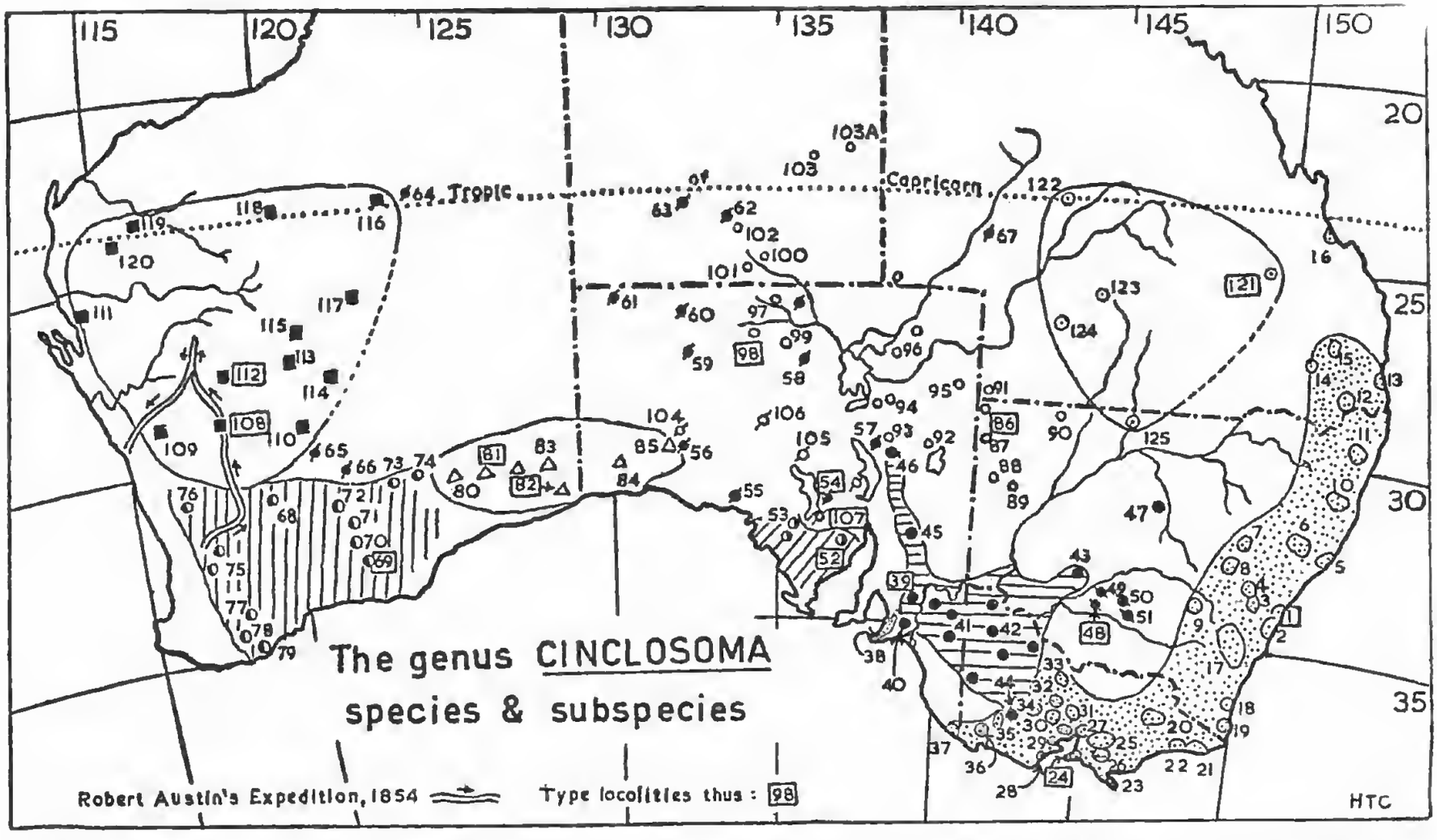

Fig. 2. Genus *Cinclosoma* in Australia. For place names see text. Nos. 1-38, Spotted Quail-Thrush, *C. p. punctatum*; 39-46, Chestnut Quail-Thrush, *C. c. castanotum*; 47, *C. c. castanotum* subsp.; 48-51, *C. c. mayri*; 52-53, *C. c. morgani*; 54-66, *C. c. clarum*; 67, *C. castanotum* subsp. (Parsons, 1921); 68-79, *C. c. dundasi*; 80-85, Nullarbor Quail-Thrush, *C. alisteri*; 86-103A, Cinnamon Quail-Thrush, *C. c. cinnamomeum*; 104-107, *C. c. samueli*; 108-110, Western Quail-Thrush, *C. m. marginatum*; 111-120, *C. m. nea*; 121-125, Chestnut-breasted Quail-Thrush, *C. castancothorax*.

For those who insist that *C. alisteri* and *C. cinnamomeum* are conspecific, it may be pointed out that Hartert (1931) was quite uncertain on this question and referred to *C. alisteri* as "a very distinct form". Campbell (1926) remarked that *C. alisteri* "is at once distinguished from other 'tawny' species by the full black throat and breast" and listed the following "specific characters":—"(*a*) Small size and dark coloration. (*b*) Upper surface entirely plain, russet. (*c*) Brown stripe not continuous before the eye; lores entirely black. (*d*) White cheek stripe not reaching the gape. (*e*) Deep chestnut patch on each side of the breast". The Campbells also referred to the Nullarbor Quail-Thrush as "an offshoot from *castanotum*". Its young are certainly more like those of the latter species than *C. cinnamomeum*. Egg coloration, often a doubtful test, lends support to the view that *C. alisteri* is distinct. Two clutches in the South Australian Museum, taken at Haig, Western Australia and 40 miles south-west of Cook, South Australia, respectively, are heavily marked with light chocolate brown on a buffy white ground. These eggs show no great resemblance to those of either *C. cinnamomeum*, in which the frecklings are pale stone colour, or *C. castanotum*, in which the eggs are usually freckled with black. Also the normal clutch of *C. alisteri* appears to be three instead of two. H. L. White (1922) has referred to the ground colour in freshly taken eggs of *C. alisteri* as having "the least possible trace of greenish tinge".

SEXUAL DIFFERENCES

Sexual dichromatism is a feature of the genus. Nothing appears to be known regarding pair formation and display but doubtless the marked sexual dimorphism not only assists the members of a pair to find each other; it is also aposematic (Huxley, 1938). Howe, in Mathews (1921: 192) describes the excited actions of parent birds attempting to defend their young and the writer has observed a male of the Chestnut Quail-Thrush, with head feathers erect, wings drooping, and tail fanned, chase an intruder (scrub-robin). Plumage differences, which are strongly developed in adults and usually readily discernible in the young, follow a basic pattern in each sex. However, in no two species are the sexes exactly alike and the minor variations which are met with have obscured inter-specific relationships. Prominent white superciliary and malar stripes distinguish males in most cases and there is also much black on the face, ventral surfaces

and wing coverts in all species, a feature which, almost invariably, is absent in females; these are much less boldly marked. Males have the wing coverts prominently spotted with white (except *C. ajax*); in females these spots are mostly buffy white.

At least one desert subspecies (*clarum*), of the widespread mallee frequenting species of *C. castanotum*, presents a bright rufous coloration dorsally in both sexes, which suggests that this colour might have been acquired independently on several occasions within the genus. This obvious adaptation to a desert environment, which involves a loss of melanin in the visible portions of the feathers, has been discussed by Meinertzhagen (1954, p. 9). It may afford some protection from the sun's rays by increasing the reflectivity of the plumage and additional "screen" protection from the sun is probably provided by the dark pigmentation of the concealed portions of the feathers, which, in *Cinclosoma*, as in many other unrelated desert forms, is considerably darker than in species living in temperate zones. This is well shown in the genus *Drymodes*, where the Northern tropical species, a rain-forest dweller, has rufous plumage of the "desert type", but the bases of the back feathers are not dark as in the inland form, *Drymodes brunneopygia*, which shows a slight amount of rufous on the rump.

There is a marked difference in the extent of rufous on the back in the sexes of the Chestnut-breasted Quail-Thrush (*C. castaneothorax*) of Queensland. In the male, the lower back and rump is rust-red, with the upper tail coverts and central rectrices fuscous; in the female, the scapulars and rump are rust-red with darker streaks and the upper tail coverts and central rectrices are brown. The female of the chestnut-breasted species is about the same size as the female of *C. castanotum* (nominate race) and at first sight could be mistaken for it. I have seen a female of *Cinclosoma castanotum clarum*, which is "red" on the back like *C. marginatum*, wrongly labelled as "*castaneothorax*".

The Nullarbor Quail-Thrush has the entire upper surface of the male, from forehead to tail, a bright rust-red, whilst in the female this colour is restricted to the scapulars, back and upper tail coverts, with the head and mantle cinnamon-brown. In the Chestnut Quail-Thrush, the amount of rufous or chestnut on the back is variable; in two forms it is most prominent in males and either reduced or completely absent in females. In another arid form of this species (*morgani*) it is equally developed in both sexes. Dorsal coloration in *C. cinnamomeum* is similar in both sexes.

Ventrally, there are important sexual differences in all species of *Cinclosoma*. Males are invariably black-throated; in *C. ajax*, *C. castanotum* and *C. alisteri* this coloration extends on to the upper breast. The greatest amount of spotting (black) on the flanks is found in males of *C. punctatum* (both sexes) and *C. ajax*; in other species the spots are reduced to streaks, and in *C. castaneothorax* the cinnamon-brown of the flanks is margined with a black line, somewhat as in *marginatum*. The flanks usually are not spotted in females. *Cinclosoma cinnamomeum* has the narrow whitish band, which separates the black of the throat and breast in males, sometimes tinged with rufous. This band disappears following wear and tear.

In the two rufous-breasted species, *C. castaneothorax* and *C. marginatum*, the breast is separated from the white abdomen by a narrow black line, which also borders the flanks, but in the lastnamed the flanks are of the same colour as the breast (bright cinnamon) whereas in *C. castaneothorax* the flanks are more brownish.

With the exception of *C. punctatum*, which is similarly spotted on the flanks in both sexes, no black appears on the flanks of females. In *C. punctatum* the upper breast is grey in males and females. The throat and breast are greyish in females of *C. castanotum*, *C. alisteri* and *C. cinnamomeum* and more rufous in the two remaining species. In females the centre of the abdomen and lower breast is white in all species, although the extent of white in *C. castaneothorax* is much less than in either *C. marginatum* or *C. cinnamomeum* and more as in *C. castanotum*.

The reduction of the superciliary stripe, which is buff in the male of the Chestnut-breasted Quail-Thrush, and the incorporation of the malar stripe in the light-coloured throat of the female in this species, perhaps indicates a trend towards the condition found in New Guinea birds (*C. ajax*), where the eyebrow is entirely absent in the male and the throat and malar stripe (white) are merged in the female. As already mentioned, there are distinct differences in the markings of the head, face and throat in the different species (plates 12, 13) and these may be used to separate them in the field and, more especially, in the hand (see the key). Males have red irides; in females these are brown except in *C. punctatum*, where the colour is grey.

It is probable that all the forms of *Cinclosoma* are vicarious, but I have been unable to find any real reason why the more or less ecologically similar desert-dwelling species should be lumped together under one species.

KEY TO THE SPECIES

Males (all have black throat when fully adult).

1.	No superciliary stripe; wing coverts and alula black, unspotted	*ajax*
	Superciliary stripe present; wing coverts and alula black with white spots	2
2.	Throat black, sharply defined from the breast	3
	Throat and upper breast black	4
3.	Breast grey, a large white malar patch	*punctatum*
	Breast rufous, a white malar stripe extending from near the gape	6
4.	A whitish band on the foreneck, which separates the black of the throat and upper breast (see text)	*cinnamomeum*
	Foreneck black	5
5.	Sides of breast grey, white malar stripe	*castanotum*
	Sides of breast chestnut, an enlarged white malar stripe	*alisteri*
6.	Superciliary stripe white	*marginatum*
	Superciliary stripe buff	*castaneothorax*

Females (the throat is never black).

1.	Coloration of throat and malar region uniform	2
	Malar region distinct from throat	3
2.	Throat and malar region white	*ajax*
	Throat and malar region orange-buff	6
3.	Breast grey; a large orange-buff malar patch	*punctatum*
	Breast grey; a malar stripe extending from near the gape	4
4.	Throat pale; malar stripe orange-buff; breast fawn grey	*cinnamomeum*
	Throat same shade as breast, grey	5
5.	A white malar stripe	*castanotum*
	An enlarged white malar stripe	*alisteri*
6.	Superciliary stripe buffy-white; breast deep cinnamon	*marginatum*
	Superciliary stripe pale orange-buff; breast pale brown	*castaneothorax*

SYSTEMATIC TREATMENT

1. **Cinclosoma punctatum** (Shaw) 1795

(Spotted Quail-Thrush)

The Spotted Quail-Thrush is a denizen of the drier sclerophyll forests of the highlands of eastern and southern Australia and Tasmania (fig. 2). It is a declining species which has been wiped out in many districts following the destruction of its natural habitat. A set of two eggs in the South Australian Museum (Malcolm Murray collection), labelled "near Mt. Gambier. Dr. Morgan, November 11, 1898", is the only evidence that the species may have once occurred in that part of South Australia. In the southern Mount Lofty Ranges the Spotted Quail-Thrush, unlike much of the indigenous fauna, has found a temporary haven in some of the government-owned pine forests, where its future is uncertain. But wherever the native vegetation remains undisturbed the birds occur in fair numbers and there is little doubt that they were very numerous in the early days of settlement on the mainland as well as Tasmania, where they were often killed for food.

The species shares with *C. ajax*, of New Guinea, the distinction of having flesh-coloured or pale brown legs and feet.

Judging from the eggs, the nesting record of *C. castaneothorax* from Gladstone, Queensland by Barnard (1900), should be referred here. The Spotted Quail-Thrush is "still a well-known bird on the Darling Downs" (A. C. Cameron, *in litt.*, January, 1962).

(a) **Cinclosoma punctatum punctatum** (Shaw) 1795

Turdus punctatum Shaw 1795. *Zool. Nov. Holl.*, 3, pl. 9. New South Wales.

Synonym: *neglectum* Mathews 1912. Frankston, Victoria.

Range: Southern Queensland from Gladstone (?), Bunya Mountains and the Brisbane area south to coastal New South Wales (as far inland as Grenfell) and Victoria (north to beyond Bendigo) and westwards towards the Glenelg River district in suitable localities; extinct in many districts. In South Australia, confined to parts of the Mount Lofty Ranges; probably extinct in the Mount Gambier district. Not on Kangaroo Island.

Diagnosis: Grey breast band margined with black in male only. General coloration and size variable and similar to the Tasmanian form. Wing—Males, 111-112 (Queensland), 113-120 (New South Wales), 103-115 (Victoria), 105, 114 (South Australia); females, 108-

111 (Queensland), 104-115 (New South Wales), 106, 112 (Victoria), 102-111 (South Australia). Tarsus—30. Bill—16-17 mm.

Bill black, iris grey, legs and feet pale brown (male); bill black, iris grey with a tinge of lilac, inside mouth orange, legs and feet pale brown (female).

Judging from variation in wing measurements, which is probably clinal, the largest birds of both sexes come from New South Wales. It has not been established that the members of the relict Mount Lofty population are smaller than those from Victoria, as suggested by Campbell (1926), but it is thought that they may differ in having more grey on the wings.

Mathews (1912) introduced the name *neglectum* for Victorian birds, saying "differs from *C. p. punctatum* in its darker coloration, but paler than *C. p. dovei*". According to Hartert (1931), the type was an adult female from Frankston, Victoria, taken on March 13, 1909. The name *neglectum* was dropped by its author from his Working List (1946) and has been rejected by most other workers.

Localities: (see fig. 2, Nos. 1-38). 1. Sydney (type locality; 2. Port Hacking and National Park area; 3. Colo River; 4. Lithgow; 5. Lake Wallis area; 6. Barrington Tops; 7. Cobbora; 8. Wellington district; 9. Grenfell; 10. Upper reaches of Macleay River; 11. Copmanhurst (North, 1904, p. 325); 12. Emu Vale and Warwick (specimens, American Museum); 13. Brisbane (specimens, Queensland Museum); 14. Darling Downs (eggs, *Emu*, p. 63); 15. Bunya Mountains (specimens, American Museum); 16. Gladstone (Barnard, 1900); 17. Goulburn-Braidwood district; 18. Bega district; 19. Wonboyn (Favaloro); 20. Buffalo Mountains; 21 Mallacoota (S. A. White); 22. Marlo (Bryant); 23. Wilson Promontory; 24. Mornington Peninsula (Frankston) (type locality, *neglectum* Mathews); 25. Gippsland; 26. Lang Lang; 27. Mitcham-Ringwood area; 28. Anglesea (Purnell, *Emu*, 15; 41); 29. near Geelong; 30. Ballarat (specimen); 31. Gisborne-Macedon area; 32. Castlemaine; 33. North of Bendigo (Hitchcock, pers. comm.); 34. Pyrenees Mountains, near Ararat; 35. Grampians; 36. Hotspur; 37. Mount Gambier (eggs, South Australian Museum); 38. Mount Lofty Ranges.

Other localities not shown on map: New South Wales:—Between Bermagui and Tathra (Edwards); Lockwood; Mount Irvine; Wolgan (specimens). Victoria:—A. Gippsland and eastern Victoria; north of Buchan (specimen); Deddich road, near Gelantipy (specimen); Drouin (Batey); Glenaroua; Hazelwood (specimens); Mount

Cobbler, 4,500 feet (Cole); Mount William, near Lancefield (Batey); Merriman Creek (Ingle); Nyora; Reeves River; Tambo River (specimens); Tanjil River and Ranges (Ford); Sheep Station Point, Gippsland lakes; Yinnar (specimens). B. West and north of Melbourne:—Dog Rocks, near Geelong (Hill); Toolern Vale (30 miles west of Melbourne) (Campbell); You Yangs (Bird Observers Club).

South Australia (Mount Lofty Ranges): near Adelaide; Ambleside; Basket Range; Belair; Blackwood; Blakiston; Bridgewater; Cape Jervis; Chain-of-Ponds; Eden Hills; Encounter Bay; Kuitpo; Lobethal; Meadows; Mitcham; Mount Lofty; Teatree Gully; Upper Sturt; Uraidla (specimens and/or observations in each case).

(b) **Cinclosoma punctatum dovei** Mathews 1912

Cinclosoma punctatum dovei Mathews 1912. *Nov. Zool.*, 18, p. 330. Tasmania.

Range: Tasmania.

Diagnosis: The male differs from the mainland bird in being, usually, more greyish on the head and back. There is a black margin to the grey breast band in both sexes. The abdomen, in females, is pure white. Wing—"Males, 107-111; females, 102, 109" (E. Mayr). Tarsus—31. Bill—16 mm.

Some of the differences to be found in Tasmanian birds were first recognized by Campbell (1926) and they have been confirmed by examination of material in the Mathews collection in New York by Drs. Mayr and Keast. As pointed out by Hartert (1931), in size *dovei* falls within the range of the mainland form. Referring to Mathews' description of the type ("smaller and darker"), Hartert notes that it has no original label and that a second specimen in Mathews' collection is not "darker" than mainland examples. Actually, plumage coloration is variable, some birds being more greyish above than others. Also the throat of the female may be either mottled greyish or buffy-white.

Howe (1931) stated that the eggs of Tasmanian birds are "rather larger" than those from the mainland; also that the clutch "often" consists of three or four eggs, perhaps even five. Campbell (1900) referred to reports of large clutch sizes; see also Littler (1910). Sharland (1958), who gives the clutch size as two to three, considers that the Spotted Quail-Thrush is "a diminishing species in southern Tasmania and does not appear to be common anywhere" for which he blames the domestic cat. Littler (1910) says ". . . in no locality is

it as plentiful as it was before the country was opened up . . .", when it was "extremely plentiful" and sold in the markets as a food delicacy.

Localities: (not shown on map, fig. 2). Cullenswood; Freycinet Peninsula; Hobart; Mount Wellington; Sandford; Wilmot; near Koonya and Impression Bay.

2. **Cinclosoma castanotum** Gould 1840

(Chestnut Quail-Thrush)

The Chestnut Quail-Thrush, which is confined to the southern half of Australia, is the most widely-distributed of all the species of *Cinclosoma* (fig. 3) and shows the greatest geographical divergence. It does not occur in localities with an annual rainfall of more than 30 inches. In the northern parts of its range the natural habitat is arid scrub, with eucalypts in the minority, whilst in the south the habitat is semi-arid or sclerophyll mallee, with *Eucalyptus* species predominating.

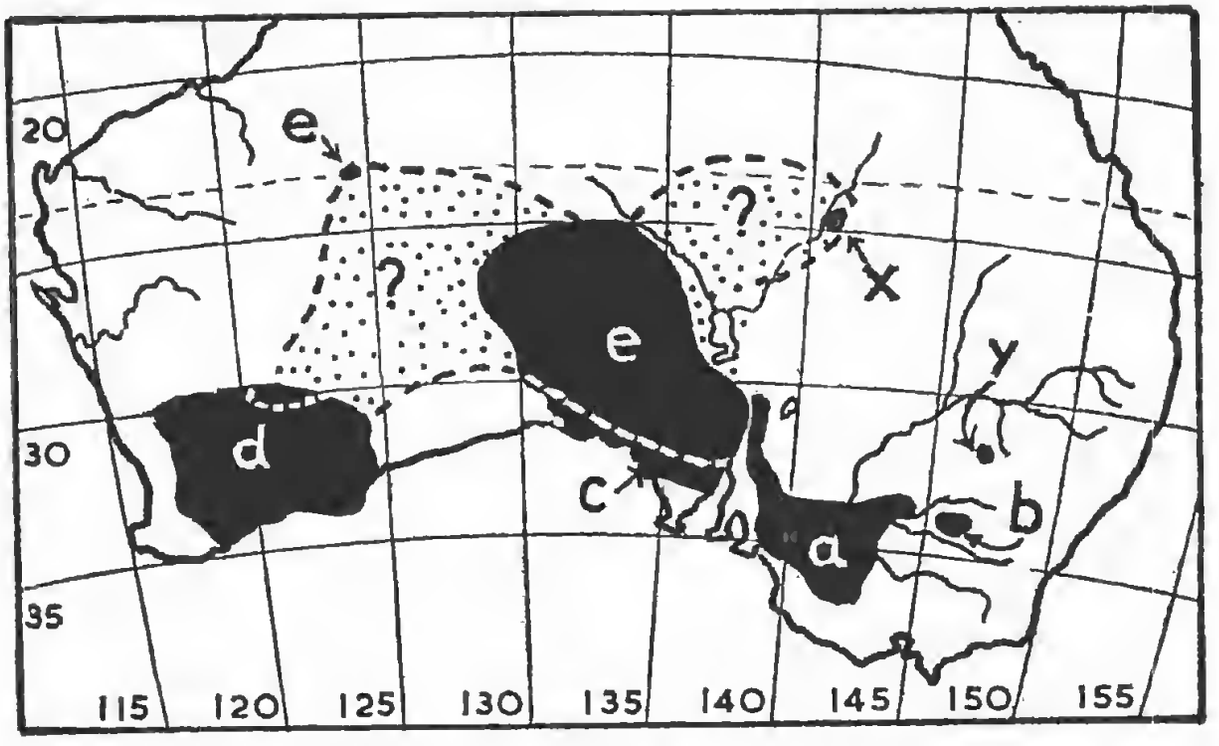

Fig. 3. Distribution of Chestnut Quail-Thrush, *Cinclosoma castanotum*. The subspecies are: a—*castanotum*; b—*mayri*; c—*morgani*; d—*dundasi*; e—*clarum*. Stippled areas = probable range, from which no specimens have been taken. Note that *C. c. clarum* overlaps the geographical rauge of *C. cinnamomeum* (cf. fig. 4). x = subsp. (?) (Parsons, 1921); y = subsp. (?) (Keast, pers. comm., 1959).

Keast (pers. comm.) observed the Chestnut Quail-Thrush at Nymagee (fig. 2, No. 47; fig. 3, y) near the northernmost extension of the mallee in New South Wales, but failed to obtain a specimen.

Like the preceding species, *Cinclosoma castanotum* has been driven from much of its former habitat in the wheat-growing districts and its range and numbers must continue to diminish.

The following subspecies, some of which are isolates, may be distinguished:

A. Dark chestnut rump in male (greatly reduced or absent in female):
   (*a*) Size small, general coloration olive brown *castanotum*
   (*b*) Size larger, general coloration darker . . . *mayri* nov.

B. Chestnut rump brighter and more extensive:
   (*c*) Coloration of rump equally developed in both sexes . . . . . *morgani*
   (*d*) Coloration of rump reduced or absent in females . . . . . *dundasi*
   (*e*) Back, scapulars, rump and portion of upper tail coverts light chestnut and equally developed in both sexes . . . . . *clarum*

(a) **Cinclosoma castanotum castanotum** Gould 1840

Cinclosoma castanotum Gould 1840. Birds Austr., part 1, Dec. 1. Belts of the Murray, South Australia.

Range: Semi-arid Mallee districts of south-eastern South Australia (as far north as Leigh Creek) and adjacent parts of New South Wales (east to about Mossgiel) and north-western Victoria (south to Ironbark Ranges) (Howe, 1909), and south of Ararat (Hill, 1907).

Diagnosis: Olive brown above (greyish) with a dark chestnut band (40 mm. maximum width) restricted to the rump in males and absent or greatly reduced in females and young birds. Flanks brown. Ear coverts olive brown.

Measurements: Wing—Males, 98-105; females, 95-103. Tail—Males, 94-99; females, 95-98. Tarsus—28. Bill—13-16 mm.

Gould's cotypes, which are housed in the Academy of Natural Sciences of Philadelphia, were obtained east of the Mount Lofty highlands in Mallee scrub near the River Murray in the direction of Morgan. De Schauensee (1957) says "Gould's plate shows a male and a female, the male being a particularly richly coloured individual,

with which the type agrees". He gives the following measurements: "Adult male, wing 105, tail 94; adult female, wing 98; culmen 16".

Campbells' description (1926) of a male from Karoonda, South Australia (B516), which they call a "plesiotype", fits most individuals of this race.

A specimen in the Australian Museum, Sydney (O.18077) bears the label "Adelaide, 1864", which is questionable.

Localities: (see fig. 2, Nos. 39-46). 39. Belts of the Murray River (type locality); 40. Chauncy's Line; 41. Pinnaroo area; 42. Mossgiel; 43. Ouyen; 44. near Ararat (*Emu*, 44: 190); 45. Oodlawirra; Leigh Creek (specimens).

Other localities, not shown on map:—Victoria—Antwerp (near Jeparit; between Hattah and Kulkyne; Ironbark Ranges (near Stawell) (*Emu*, 8: 135); Kow Plains; Lake Boga; Nhill; Panitya; Pine Plains; Red Cliffs; Turriff; Wyperfield.

South Australia—Alawoona; Bowhill (specimen); Copley; Flinders Ranges near Lake Frome (*S. Austr. Orn.*, 4: 73); Loxton; between Murray Bridge and Karoonda (*ibid.*, 10: 32); Mannum; Paringa; Patsy Springs (Copley) (eggs); Renmark area (*ibid.*, 5: 72); Sutherlands; Taplan; between Truro and Blanchetown; Turner Well.

(b) **Cinclosoma castanotum mayri** subsp. nov.

Type locality: 20 miles south of Rankin Springs, New South Wales. Type: Australian Museum No. O 39745; adult male. Allotype: Australian Museum No. O 39688; adult female.

Diagnosis: Larger and darker than the nominate form. Adult male:—Crown, ear coverts and dorsal surfaces olive brown, without a greyish tinge; chestnut rump 47 mm. wide (against 40 mm. in *castanotum*); white malar stripe 40 mm. long (against 30 mm. in *castanotum*); extent of black from chin to lower breast 80 mm. (in *castanotum* this does not exceed 52 mm.). Flanks reddish brown. Wing, 107; tail, 112; tarsus, 31; bill, 17 mm. "Gonads developing; no surplus fat; stomach contents seeds and insect remains" (collector's label). Fresh plumage. Collector, J. A. Keast, September 15, 1957. Adult female:—Large. Dorsal coloration similar to male, except for rump, which is tinged with dark chestnut only; malar stripe well developed. Wing, 100; tail, 99; tarsus, 30; bill, 16 mm. "Stomach contents, seeds." Fresh plumage. Collector, H. J. Frith, April 8, 1955. Locality, 27 miles north of Griffith, New South Wales.

The presence of the Chestnut Quail-Thrush in some scattered belts of Mallee scrub in the Murrumbidgee Irrigation area of New South Wales has long been known (Emerson and Gannon, 1934; Chisholm, 1938). Rather surprisingly, specimens collected have proved to be almost as large in body size as the Spotted Quail-Thrush; the population is, of course, an isolate.

Localities: (see fig. 2, Nos. 48-51). 48. Rankin Springs (type locality); 49. Griffith; 50. Barellan (*Emu*, 37: 307); Leeton (*ibid.* 22: 311). Also 36 miles north of Narrandera (Chisholm).

(c) **Cinclosoma castanotum morgani** Condon 1951

Cinclosoma castanotum morgani Condon 1951. *S. Austr. Orn.*, 20, p. 42. 18 m. north-west of Kimba, South Australia.

Range: Eyre Peninsula, South Australia. Probably extinct in many localities.

Diagnosis: Upper back (mantle) olive brown. Lower back, rump and portion of the upper tail coverts bright chestnut and equally developed in both sexes. Ear coverts olive brown. Wing—Males, 102, 105; females, 92, 97. Bill, 18. Tarsus, 30 mm.

In size and coloration this geographical variant, which is mentioned by Campbell (1926) and Morgan (1926), is intermediate between *clarum* and nominate *castanotum*. Like *clarum*, it is exceptional in having the male and female similarly coloured on the upper surface, but the chestnut on the back is less extensive (47 mm. wide). The type, a breeding male, is in the South Australian Museum (No. B 5673).

Localities: (see fig. 2, Nos. 52-53). 52. 18 m. north-west of Kimba (type locality); Gawler Ranges area (specimens).

(d) **Cinclosoma castanotum dundasi** Mathews 1912

Cinclosoma castanotum dundasi Mathews 1912. *Nov. Zool.*, 18, p. 330. Lake Dundas, Western Australia.

Range: South-western Australia ("north to the mulga-eucalypt line . . . but excluding the heavy forested area" (Serventy and Whittell, 1951). Probably extinct in a number of localities.

Diagnosis: The male resembles *morgani*, with the chestnut rump about 47 mm. wide, but differs in having a shorter bill and longer tarsus. Female is dull-coloured, the rump being either tinged with chestnut (in the more easterly parts of the range) or plain. Ear

coverts olive brown. Wing—Males, 97-101; females, 95-99. Tarsus, 34. Bill, 12-15 mm.

The type, which is in the Mathews collection, was collected by F. L. Whitlock, at an altitude of 850 feet, on July 16, 1905; Mathews' figure (1921, pl. 424) is hardly recognizable. A topotypical male, taken by Dr. D. L. Serventy at a place 10 miles south of Widgiemooltha, near Lake Dundas, on March 22, 1937, has been examined. Details of specimen: "Iris, port-wine red; feet lead grey. Length, 250; head 47; wing 98; tail 105 mm." (Serventy/Whittell collection, No. 746).

Most authors accept *dundasi;* some have suggested that *clarum* (below) should be included with it. Further collecting in the western part of its range may show clinal differences with the trend, in the western parts of the range, towards a darker chestnut rump.

The habitat is mainly semi-arid scrub (Mallee), but it may include areas of temperate woodland.

Localities: (see fig. 2, Nos. 68-79). 68. North of Southern Cross; 69. Lake Dundas (type locality); 70. near Norseman; 71. Widgiemooltha (specimens); 72. Coolgardie (*Emu*, 27: 180); 73. 80 m. east of Kalgoorlie (*ibid.*, 10: 70); 74. near Nullarbor Plain; 75. Parker Range; Dwaladine; Woyaline (*Ibis*, 3 (ser. 9): 683) (specimens); 76. Wongan Hills; 77. Broome Hill; 78. Cranbrook; 79. Albany (specimens). Specimens from other localities not shown on map:—Gracefield; Woryantilla; Mongup (Salt River); 53 m. from Fremantle (on York road) (Gould).

(e) **Cinclosoma castanotum clarum** Morgan 1926

Cinclosoma castanotum clarum Morgan 1926. *S. Austr. Orn.*, 8. p. 138.
Wipipippee rocks, near Lake Gairdner, South Australia.

Range: From the MacDonnell Ranges, Northern Territory westwards to Separation Well, Callion, and north of Kalgoorlie, Western Australia; Musgrave and Everard Ranges south to about Lake Gairdner, South Australia.

Diagnosis: The most brightly coloured of all the forms of *castanotum*. The back, scapulars, rump, and portion of the upper tail coverts are light chestnut ("burnt sienna") in both sexes. The white tips of the wing coverts are enlarged. Ear coverts blackish in the male. Examples from the northern parts of the range are more tawny on the flanks. Wing—Males, 98-102; females, 97-102. Tarsus, 30. Bill, 19 mm.

Specimens of *clarum* have now been taken from such widely separated localities as Lake Gairdner, Everard and Macdonnell Ranges and north of Kalgoorlie. There is a specimen in the Australian Museum which was collected by the Horn Expedition at Deering Creek, Northern Territory and another, a female, from Callion, Western Australia in the Queensland Museum (No. 06768). A further skin, from near Ooldea is contained in the National Museum of Victoria (No. R9574).

The type, a male, was collected by Dr. A. M. Morgan at a spot about 5 miles east of the southern end of Lake Gairdner on August 17, 1905; it is housed in the South Australian Museum, No. B7705. An adult pair was taken by R. Williams at a place between the Musgrave and Everard Ranges, South Australia, in September, 1926. Other records which can be referred to *clarum* are from Edward Creek (Simpson, 1933), Myrtle Springs, South Australia (Cain, 1935) and near Separation Well, North-west Australia (Keartland, in North, 1909). Whitlock (1910), knowing nothing of this rufous form of *C. castanotum*, which was not described until sixteen years later, suggested that Keartland met with *C. marginatum*, not *C. castanotum*, at Separation Well. However, although the latter's specimens were lost before he returned to civilization, there is no reason to doubt his identification.

Females should not be confused with those of any other desert species; the foreneck and throat, as in all forms of *C. castanotum*, is grey.

The habitat of *clarum* differs from that of other subspecies of *C. castanotum*, being an arid Mulga scrub formation, rather than Mallee. In northern South Australia, the range of *clarum* overlaps that of the Cinnamon Quail-Thrush (see figs. 3, 4), but the latter is restricted mainly to open stony (gibber) country and in the strictest sense should not be regarded as sympatric with *clarum*. In Western Australia the ranges of *clarum* and *marginatum* are probably contiguous, and, depending on the nature of the terrain and vegetation, the occurrence of the former may be limited to "pockets" of trees and taller shrubs within the central desert areas of Western Australia from which, as yet, no member of the genus has been collected or reported.

Localities: (see fig. 2, Nos. 54-67). South Australia. 54. Wipipippee Rocks (type locality); 55. near Ceduna (*S. Austr. Orn.*, 9: 144); 55. Ooldea (specimen); 57. Myrtle Springs (*S. Austr. Orn.*, 13:

10); 58. Edward Creek (*ibid.*, 12: 129); 59. Everard Ranges (*ibid.*, 17: 6); 60. Officer Creek (eggs) (*Emu*, 15: 35); 61. between Musgrave and Mann Ranges (specimens); 62. Hermannsburg (Horn Expedition); Deering Creek (specimen) (Horn Expedition). Western Australia. 64. Separation Well (*Trans. Roy Soc. S. Austr.*, 22: 180); 65. near Menzies (North, 1: 326); 66. north of Kalgoorlie (specimen). Queensland. 67. Diamantina Gates (identity uncertain (Parsons, *S. Austr. Orn.*, 6: 20).

3. **Cinclosoma alisteri** Mathews 1910

(Nullarbor Quail-Thrush)

Cinclosoma alisteri Mathews 1910. *Bull. Brit. Orn. Cl.*, 27, p. 160. Waddilinia, Nullarbor Plain, Western Australia.

Synonym: *nullarborensis* Campbell 1922. Haig and Naretha, Western Australia.

Range: Nullarbor Plain, Western and South Australia (fig. 4).

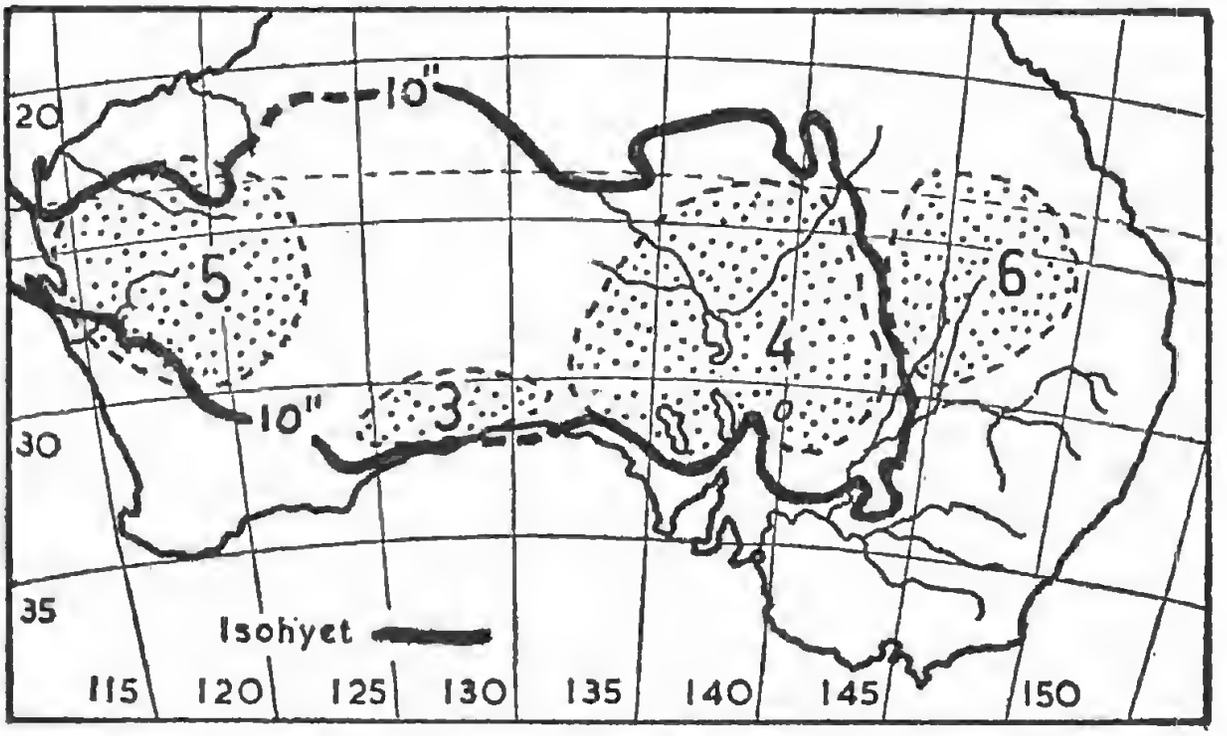

Fig. 4. Distribution of the arid species of *Cinclosoma*. 3, Nullarbor Quail-Thrush, *C. alisteri*, which is confined to the shrub steppe region known as the Nullarbor Plain; 4, Cinnamon Quail-Thrush, *C. cinnamomeum*, in the areas of lowest rainfall, the environment being arid grasslands and stony (gibber) deserts; 5, Western Qail-Thrush, *C. marginatum*, in a region isolated from the other forms; 6, Chestnut-breasted Quail-Thrush, *C. castaneothorax*, which lives in open scrublands. Note that all, except the last-named, are contained within the 10-inch annual isohyet.

Diagnosis: The entire upper surfaces, including the central rectrices, are rich rufous ("auburn" or "russet") in the adult male, which has the ear coverts, throat, and breast black. The adult female is duller rufous on the head and back, the superciliary and malar stripes are whitish, and the ear coverts, throat, and breast are grey. In both sexes the under tail coverts are buff, spotted with dark brown. Juvenals are dull rufous above and the feathers of the breast have dusky or blackish edgings which become more intense with age, in males.

Measurements: Wing—Male, 81-92; male juv., 78; female, 85, 86. Tarsus—Male, 28; juv., 24; female, 25. Bill—16 (adult); 14 mm. (male juv.).

The Nullarbor Quail-Thrush is a rarity in collections. There is a small series, of about seven skins, in the H. L. White collection (National Museum of Victoria), two skins in the Australian Museum, Sydney, and three males in the Mathews collection (American Museum of Natural History). There are no specimens in the South Australian Museum. It is worth while emphasizing that *C. alisteri,* which has no subspecies, is a much deeper rufous bird than *C. cinnamomeum,* with the markings of the throat and breast, in both sexes, more as in *C. castanotum.*

Localities: (see fig. 2, Nos. 80-85). 80. Waddilinia (type locality); 81. Haig (type of *nullarborensis* Campbell); 82. Loongana; 83. Forrest; 84. 40 miles S.W. of Cook (eggs); 85. Ooldea. Not shown on map:—Naretha.

4. **Cinclosoma cinnamomeum** Gould 1846

(Cinnamon Quail-Thrush)

The Cinnamon Quail-Thrush lives in the stony (gibber) deserts and sandhill country of Central Australia, where the annual rainfall is less than 10 inches (fig. 4). The geographical range extends further north and south than shown in the map by Campbell (1926). This is a variable species, both in size and coloration, and two subspecies may be recognized.

(a) **Cinclosoma cinnamomeum cinnamomeum** Gould 1846

Cinclosoma cinnamomeum Gould 1846. *Proc. Zool. Soc.*, London, p. 68. Sturt's Depot, north-western New South Wales.

Synonym: *todmordeni* Mathews, 1923. Todmorden, South Australia.

Range: Eastern desert regions of lower Northern Territory (extending to just above the Tropic of Capricorn) far south-western Queensland, far north-western corner of New South Wales, and northern South Australia south to about Lake Torrens, Lake Frome and the vicinity of Leigh Creek.

Diagnosis: Larger in body-size (not shown by wing and tail measurements). Head more greyish than the back; ear coverts dark greyish brown. Wing—Males, 85-90; females, 81-87. Tarsus, 28. Bill, 16 mm.

Females are usually paler than males with the wing coverts brownish black with prominent white tips. The female figured by Mathews (1921, pl. 426) is a specimen from near the Macumba River, South Australia. Young birds have the feathers edged with black, forming crescents, especially on the under surface. Abrasion causes some variation in the plumage pattern of males. Birds from near the centre of the range, separated as *todmordeni* by Mathews, are often palest (caused by fading and wear), but light and dark individuals have been examined from the same locality. Specimens from Todmorden, Oodnadatta, Birdsville and Lake Frome are indistingushable in most instances.

Of special interest is a specimen taken for the Northern Territory Administration by Mr. W. B. Hitchcock, on May 9, 1955; the locality was "19 miles east of Cockroach W.H., Jervois S. R.". The specimen, an immature male, is temporarily housed in the National Museum of Victoria. Details from the collector's label are:—"Male, skull n.f.o.; iris warm sepia; moult-legs; humeral (slight). On road and on stony ground in *Acacia georginae* and *Cassia* sp. community". This represents the northernmost record of the genus in Australia, although previously (1949), the late L. J. Ellis took a set of two eggs of a species he was unable to identify in rocky country in the Jervois Range, Northern Territory, at a spot south-west of Cockroach W.H.

Localities: (see fig. 2, Nos. 86-104). 86. Sturt Depot (type locality); 87. Mount Arrowsmith; 88. Lake Bancannia; 89. west of Wilcannia; 90. west of Paroo River; 91. Naryilco Station; 92. Lake Frome; 93. Leigh Creek; 94. north of Marree; 95. Murturee, Strzelecki Creek; 96. Mirramitta; 97. Blood's Creek; 98. Todmorden (type locality of *todmordeni*); 99. near Oodnadatta; 100. Horseshoe Bend; 101. Crown Point; 102. near Hermannsburg; 103. Jervois Range; 103A. 19 m. E. of Cockroach W.H., Jervois S.R. (Hitchcock); 104. Ooldea (specimen).

(b) **Cinclosoma cinnamomeum samueli** (Mathews) 1916

Samuela cinnamomea samueli Mathews 1916. *Austral Av. Rec.*, 3, p. 60. Gawler Ranges, South Australia.

Range: South-west of Lake Eyre, extending through Stuart Range to Ooldea and the Gawler Ranges.

Diagnosis: Cinnamon coloration brighter and more intense; the crown and ear coverts have a rufous wash and the amount of white on the band separating the black breast and throat is somewhat reduced. Wing—Males, 85-90; females, 80-85. Tarsus, 27. Bill, 15 mm.

It has not been possible to determine exactly the northern limits of *samueli*. Probably it does not extend beyond a line drawn from Stuart Range to the northern shores of Lake Torrens. The type, a male in the Mathews collection, came from Sandford's paddock, a holding in the Gawler Ranges; it was taken on September 3, 1912, by S. A. White.

Hartert (1931) correctly points out that this form has nothing to do with the North-western Australian form *C. marginatum*, which Mathews calls "*nea*" in his 1931 List. *Samueli* can be distinguished by its small body size and greater amount of rufous coloration on the crown and ear coverts; it can in no way be confused with *castaneothorax*, from Queensland, with which Hartert was inclined to unite it. Material examined suggests that females may have more grey on the throat than those of the nominate form, but occasional examples are met with the throat pale buffy white. The general coloration, in both sexes, is more rufous, or of a deeper shade, than in the northern race, not "paler" as stated by Mathews, whose type was "very worn and in poor condition" (Hartert, *loc. cit.*).

Localities: (see fig. 2, Nos. 105-107). 105. Mount Eba; 106. Stuart Range; 107. Gawler Ranges (type locality of *samueli*).

5. **Cinclosoma marginatum** Sharpe 1883
(Western Quail-Thrush)

The Western Quail-Thrush occupies the Mulga scrubs of the huge pastoral area of North-western Australia, its range, so far as known, extending from just north of the Tropic of Capricorn southwards to the agricultural areas and eastwards towards the sand dune desert country where hummock-forming xeromorphic grasses (*Triodia*, etc.) predominate (fig. 4, No. 5).

Much confusion has arisen regarding the correct name for this form of *Cinclosoma* following Mathews' decision (1927) to treat *C. marginatum* and *C. cinnamomeum* as conspecific. Previously the former had been combined with *C. castaneothorax* (see Australian *Official Checklist*, 1926). Making an erroneous assumption, Mathews suppressed the name *marginatum* Sharpe and substituted for it instead one of his earlier names, *nea*. He argued, correctly, that Elsey, whom Sharpe had named as the collector of the type of *C. marginatum*, had never been in Western Australia and then went on to propose "North-west New South Wales" as the type locality for *C. marginatum*. In doing so, he ignored an entry in the British Museum register which stated that Sharpe's type was "from an Australian Expedition, probably Mr. Austin's, W. Austr.".

Robert Austin was a surveyor who arrived in Western Australia in 1840. Four years later he made a trip via lakes Cowcowing and Austin to the upper reaches of the Murchison and then proceeded to Geraldton. The route of this expedition is shown on early published maps of Western Australia (*e.g.*, Philip's Handy General Atlas of the World, 1882). Austin returned with a small collection of bird skins for the British Museum. Among them were two skins of *Cinclosoma*, collected in the vicinity of Mount Kenneth, 70 miles south of Mount Magnet (Whittell, 1954); the type locality of Sharpe's *C. marginatum* should be amended accordingly.

The inland form of *C. marginatum* is smaller and paler than the bird described by Sharpe, and Mathews' name, *nea*, is available for it.

Unfortunately, Hartert (1931) treated *nea* as a form of *C. cinnamomeum* and the true situation has been further obscured by Whittell and Serventy (1948), who have rejected both *marginatum* and *nea*, employing instead the name *castaneothorax* (type locality "South Queensland") as a subspecific designation in combination with *Cinclosoma cinnamomeum* for birds from North-western Australia. This course has recently been followed by Lindgren (1961) whose reference to the "Cinnamon Quail-Thrush" at Jigalong (Lat. 23 deg. 24 min. S., Long. 120 deg. 46 min. E.) should, of course, be applied to the Western Quail-Thrush.

As pointed out by Gentilli (1961) the habitat of *C. marginatum* has suffered great changes owing to overgrazing by sheep and the plant cover "in some places has been almost wiped out". Thus it seems that, like other members of the genus, *C. marginatum* will have little opportunity to adapt itself to the new conditions imposed by man.

(a) **Cinclosoma marginatum marginatum** Sharpe 1883

Cinclosoma marginatum Sharpe 1883. Cat. Bds., Brit. Mus., 7, p. 336. Type locality, amended herein, Mount Kenneth, Western Australia.

Range: Coastal regions from about the Tropic of Capricorn, extending to south-east of the Murchison River, within the 10-inch rainfall belt, Western Australia.

Diagnosis: Males have a bright rufous (cinnamon) breast band, dark brown ear coverts and a well-defined dark crown. The eyebrow is white and the breast and flanks are bordered with black. The under tail coverts are black edged with white. The back rump, central rectrices and flanks are bright rufous in both sexes.

Females have a dark crown, brown ear coverts, the throat, superciliary stripe and malar region deep buff, the back is streaked darker, and there is very little white on the rufous abdomen. The under tail coverts are reddish-brown tipped with white, with a narrow subterminal black band.

Wing—Males, 91, 97; female, 97. Tail—Male, 95; female, 101. Tarsus, 29-31. Bill, 14.

Localities: (see fig. 2, Nos. 108-110). 108. Mount Kenneth (type locality); 109. near Yalgoo; 110, Mount Ida.

(b) **Cinclosoma marginatum nea** Mathews 1912

Cinclosoma castaneothorax nea Mathews 1912. *Nov. Zool.*, 18, p. 331. Day Dawn, Western Australia.

Range: North-western Australia (inland).

Diagnosis: Smaller and paler than the preceding form. Ear coverts rufous, lores brownish in the female. Wing—Males, 91-92; females, 81-91. Tarsus, 27. Bill, 15 mm.

There is little doubt that specimens from the lower rainfall regions of North-western Australia can be separated from those nearer the coast and this is borne out by descriptions published by Mathews, Campbell and other writers. Day Dawn, the type locality of *nea*, is about 50 miles north of Mount Magnet. Further material may indicate that the variation in this species is clinal, in which case some authors may prefer to drop *nea* altogether.

A small female, taken at Carnarvon, has the ear coverts brownish instead of rufous and could be referred to either form.

Localities: (see fig. 2, Nos. 111-120). 111. Carnarvon; 112. Day Dawn (type locality); 113. Wiluna (*Emu*, 9: 196); 114. Lake Darlot; 115-116. Canning Stock Route (specimens); 117. Brockman Creek (Calvert Expedition); 118. Jigalong (*W. Austr. Nat.*, 7: 114); 119 Wanery River; 120. Barlee Range.

6. **Cinclosoma castaneothorax** Gould 1849

(Chestnut-breasted Quail-Thrush)

Cinclosoma castaneothorax Gould 1849. *Proc. Zool. Soc.*, London, 1848: 139, pl. 6. Near the Dawson River, Queensland.

Range: Interior of southern Queensland and adjacent areas in New South Wales.

Diagnosis: In the male there is a glossy black throat; rich rust-red breast band edged with black; eyebrow buff; the rump and back are deep rust-red. The female has the throat and malar region orange-buff and the eyebrow is of the same colour. The breast, which is pale brown, merges into the dull cinnamon-brown of the flanks. There is no black on the under surface of the female, which has the back olive-brown and the rump reddish-brown, with indistinct darker streaks.

Bowdler Sharpe (1881) pointed out that Gould's name for this species, being a "vox hybrida", should be amended to "*erythrothorax*", but the altered spelling has never been used. In Gould's original description it was stated "Hab. Darling Downs, New South Wales" and this has been quoted generally as the type locality. However, it seems certain that the type, a male, was taken by Charles Coxen at a place north of the Darling Downs not far from where Gilbert, when collecting for Gould, saw some birds in the Valley of Ruined Castles, near the upper reaches of the Dawson River, Queensland (Chisholm, 1945) (see fig. 2, No. 121).

Only four specimens have been taken of this little known species, viz. (*a*) Gould's type, acquired by the British Museum, and, I am informed, now missing; (*b*) an adult male, collected by F. L. Berney, at Barcarolle, Thomson River, Queensland, September 4, 1925 and now in the Queensland Museum (O 3501). This bird has been described by Campbell (1926) and described and figured by Mathews (1928, pl. 44). (*c*) An adult female (South Australian Museum, No. B 21432), collected by Dr. W. MacGillivray, Adavale-Charleville road, August 27, 1923. It has been figured by Mathews (1928, pl. 44). (*d*) An adult male, taken in *Thryptomene* heath scrub country at Enngonia (near Bourke), New South Wales, September, 1960 (National

Museum of Victoria, No. B7383). Eggs were also taken near the same place in 1959.

Measurements: Type male (adapted from Gould)—Total length, 212. Wing, 100. Tail, 106. Tarsus, 25. Bill, 25 (?). Male (Berney's specimen)—Wing, 99. Tail, 105, Tarsus, 27. Bill, 14. Male (Enngonia)—Wing, 99. Tail (worn), 102. Tarsus, 28. Bill, 14. Adult female—Wing, 98. Tail, 96. Tarsus, 28. Bill, 15 mm. The male preserved in the National Museum of Victoria had a black bill and grey legs.

Gould's type was figured with the original description (1849) and a different illustration of the same bird was given in the "Supplement to the Birds of Australia" (1855, pl. 32). A further illustration of the type was supplied by Mathews (1936, pl. 70, left hand figure). It would seem that the accompanying descriptions given by Mathews at this time, wherein *C. castaneothorax* and *C. marginatum* are compared, became transposed by the printer. The male in the Queensland Museum, which is the same specimen as described by Campbell (1926), now bears the date May 20, 1926 instead of the proper date "September 4, 1925". Cameron (1932, 1938) reported seeing the species at Quilpie and Moombidary Station (Hungerford), Queensland and more recently near Bourke, New South Wales.

The Chestnut-breasted Quail-Thrush was combined with *C. marginatum* in the Australian *Checklist* (1926) because there is a superficial resemblance between the males of the two species. Of late, especially among those who have not examined specimens, the tendency has been to regard both *C. marginatum* and *C. castaneothorax* as forms of *C. cinnamomeum*. The male from Enngonia, in which the plumage is fairly fresh, is darker on the back than the specimen taken by Berney. The sternum has been preserved.

A. R. McEvey has written, "In the H. L. White collection is a set of two eggs labelled *C. castaneothorax*—taken by H. Lau, Darling Downs, Queensland, October, 1888 (see *Emu*, 8: 63). These are distinct from others labelled *marginatum alisteri* and *castanotum*. Though smaller than those of *punctatum*, they are clearly of the *punctatum* type, having a white ground colour sparingly speckled with very small umber, mauve and purple spots". The writer agrees that these eggs are probably *punctatum*.

Localities: (see fig. 2, Nos. 121-124). Near Upper Dawson River (type locality). 122. Barcarolle, Thomson River. 123. Adavale-Charleville road. 124. Quilpie. 125. Enngonia.

7. **Cinclosoma ajax** (Temminck) 1835
(New Guinea Quail-Thrush)

Eupetes ajax Temminck 1835. *Planch. Col. d'Ois.*, pl. 573. Lobo, Triton Bay, South-west New Guinea.

Range: New Guinea (lowland forests).

Iredale (1956) does not regard this species as a true quail-thrush, which it seems to be in every way. The male differs from all other members of the genus in lacking a white eyebrow and in having no white on the black wing coverts. The differences between the sexes are more marked than in any Australian species. The adult female has a white eyebrow, the throat and malar region are pure white (merged), and the wing coverts are nearly black or brown, according to the subspecies, with prominent white markings. In size *Cinclosoma ajax* approaches *C. punctatum* of the Australian mainland, being approximately 9½ inches (242 mm.) in length.

The following is a synopsis of the subspecies listed by Mayr (1941):—

(*a*) *Cinclosoma ajax ajax* (Temminck) 1835. Triton Bay, New Guinea. Larger and darker brown above than the following, with the lores and postocular stripes black. Wing—"Male, 114; female, 109, 110".

Range: Western coast of Geelvink Bay and Triton Bay.

(*b*) *Cinclosoma ajax muscalis* Rand 1940. Palmer Junction, upper Fly River, south New Guinea. Resembles *ajax* above, with the flanks and sides of the breast much paler and less vividly coloured. Wing—"Male, 108, 110".

Range: Upper Fly River, south New Guinea.

(*c*) *Cinclosoma ajax alaris* Mayr and Rand 1935. Wuroi, Oriomo River, south New Guinea. Known only from the female, which is larger and more deeply rufous above than the female of *goldei*, with the wing coverts more brownish.

(*d*) *Cinclosoma ajax goldei* (Ramsay) 1879. Port Moresby, New Guinea. Smaller and paler olive brown above than the nominate form. Wing—"Male, 103, 104". Two males, which are similar to that figured by Iredale (1956), are contained in the Australian Museum, Sydney.

Range: Milne Bay to Hall Sound, south-eastern New Guinea.

LITERATURE CITED

Amadon, Dean, 1957: *Proc. Zool. Soc.*, Caleutta; Mookerjie Mem. Vol.: 259-268.

Barnard, E. D., 1900: *Emu*, 1: 26.

Beecher, W. J., 1953: *Auk*, 70, 270-337.

Cain, W., 1935: *S. Austr. Orn.*, 13: 10.

Cameron, A. C., 1932: *Emu*, 32: 104.

——— 1938: *Ibid.*, 37: 316.

Campbell, A. J., 1922: *Ibid.*, 21: 161-2.

——— 1926: *Ibid.*, 25: 152.

Campbell, A. J. and A. G., 1926: *Ibid.*, 26: 26-40.

Chisholm, A. H., 1938: *Ibid.*, 44: 190.

——— 1945: *Ibid.*, 44: 190.

Condon, H. T., 1954: *S. Austr. Orn.*, 21: 17-27.

Delacour, J., 1946: *L'Oiseau*, 16: 14-31.

Delacour, J. and C. Vaurie, 1957: *Contrib. Sci.*, No. 16.

de Schauensee, R. M., 1957: *Proc. Acad. Nat. Sci.*, Phila., 109: 199.

Emerson, R. and R. Gannon, 1934: *Emu*, 33: 311.

Gentilli, J., 1961: *W. Austr. Nat.*, 7: 180.

Gilliard, E. T., 1958: Living Birds of the World. London. Hamish Hamilton.

Gill, E. L., 1945: First Guide to South African Birds. Cape Town. Maskew Miller.

Gould, J., 1840: *Ann. Mag. Nat. Hist.*, 5: 116.

——— 1849: *Proc. Zool. Soc.*, London, 1948: 68, pl. 6.

——— 1848: Suppl. Bds. Austr., pl. 32. London.

——— 1865: Handbk. Bds. Austr., 1: 439. London.

Hartert, E., 1931: *Nov. Zool.*, 37: 48.

Hill, G. F., 1907: *Emu*, 6: 179.

Holmes, A., 1959: *Trans. Edin. Geol. Soc.*, 17: 183-216.

Howe, F. E., *Emu*, 8: 135.

——— 1931: *Ibid.*, 20: 292.

Huxley, J. S., 1938: *Proc. 8th. Int. Orn. Congr.*, 1934: 430.

Iredale, T., 1956: Birds of New Guinea. Melbourne. Georgian House.

Keartland, G., in North, 1909: *Rec. Austr. Mus.*, Sydney, 7, No. 4.

Keast, J. A., 1958: *Austr. Journ. Zool.*, 6: 33-52.

——— 1961: *Bull. Mus. Comp. Zool.*, Harvard, 123: 305-495.

Lea, A. M. and J. T. Gray, 1935: *Emu*, 35: 93.

Lindgren, E., 1961: *W. Austr. Nat.*, 7: 174.

Mathews, G. M., 1912: *Nov. Zool.*, 18: 330.

——— 1921: Bds. Austr., 9. London. Witherby.

——— 1923: *Austr. Av. Rec.*, 5: 35.

——— 1927: Bds. Austr., 12: 427. London. Witherby.

——— 1931: List Bds. Austr., 287-8. London. Taylor and Francis.

——— 1936: Suppl. Addit., Bds. Austr., London. Witherby.

——— 1946: Working List Bds. Austr., Sydney. Shepherd and Newman.

Mayr, E., 1941: List Bds. New Guinea: 110, New York. Amer. Mus. Nat. Hist.

——— 1944: *Bull. Amer. Mus. Nat. Hist.*, 83: 123-194.

Mayr, E. and D. Amadon, 1951: *Am. Mus. Novit.*, No. 1496.

Mayr, E. and J. C. Greenway, 1956: *Breviora* (Mus. Comp. Zool., Harvard), 58: 1-11.

Meinertzhagen, R., 1954: Birds of Arabia. London. Oliver and Boyd.

North, A. J., 1897-8: *Trans. Roy. Soc. S. Austr.*, 22: 180.

——— 1901: Nests and eggs of birds found breeding in Australia and Tasmania. Vol. 1: 326. Sydney. Australian Museum.

Parsons, F. E., 1921: *S. Austr. Orn.*, 6: 20.

Royal Australasian Ornithologists Union, 1926: Official Checklist Austr. Birds.

Roberts, Austin, 1948: Bds. South Africa. Witherby.

Serventy, D. L. and H. M. Whittell, 1951: Birds of Western Australia. Perth. Paterson Press.

Sharland, M., 1958: Tasmanian Birds. Sydney. Angus and Robertson.

Sharpe, R. B., 1881: *Ibis*: 605.

——— 1883: Cat. Bds., 7: 331 *et seq.*

——— 1903: Handlist Bds., 4: 2-5.

Simpson, H., 1933: *S. Austr. Orn.*, 12: 129.

Specht, R. L., 1958: Rep. Amer.-Austr. Sci. Exped. Arnhem Land, 3: 433-438.

Vigors, N. and T. Horsfield, 1827: *Trans. Linn. Soc.*, London, 15: 219.

White, H. L., 1922: *Emu*, 21: 164.

Whitehouse, F. W., 1940: *Univ. Queensld. Papers*, 2, n.s., no. 1.

Whitlock, F. L., 1910: *Emu*, 9: 196.

Whittell, H. M., 1954: Bibliogr. Austr. Orn., p. 27. Perth. Paterson Brokensha.

Whittell, H. M. and D. L. Serventy, 1948: Syst. List Bds. W. Austr. Perth. Govt. Printer.

DESCRIPTION OF PLATES 12-13

Plate 12. Genus *Cinclosoma*. Heads of adult pairs, males on left. 1a, Spotted Quail-Thrush, *Cinclosoma punctatum punctatum*; 2a, Chestnut Quail-Thrush, *Cinclosoma castanotum castanotum*; 2b, *Cinclosoma castanotum mayri*; 3, Nullarbor Quail-Thrush, *Cinclosoma alisteri*.

Plate 13. Genus *Cinclosoma*. Heads of adult pairs, males on left. 4a, Cinnamon Quail-Thrush, *Cinclosoma cinnamomeum cinnamomeum*; 5, Western Quail-Thrush, *Cinclosoma marginatum marginatum*; 6, Chestnut-breasted Quail-Thrush, *Cinclosoma castaneothorax*; 7, New Guinea Quail-Thrush, *Cinclosoma ajax ajax*.